

# NESTING OF THE PARULA WARBLER IN MICHIGAN

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WHILE making a distributional study of the birds of Wilderness State Park in Emmet County, northwestern Lower Michigan, from June 9 to August 5, 1949, we observed the nesting of four pairs of Parula Warblers (*Parula americana*). This species has long been known to summer in Michigan, but up to 1938 no actual nest had been reported (Van Tyne, 1938: 32). The May 12 "nesting" date published by Chapman (1932: 454) apparently was a migration date from Wood (1908. *Auk*, 25: 12). Wood's manuscript notes include no unpublished nesting data.

Wilderness Park occupies 7,800 acres, including Waugoshance Point—a narrow peninsula extending westward into Lake Michigan and forming the northern boundary of Sturgeon Bay. The sandy north shore of Waugoshance Point is bordered first by small dunes sparsely covered with *Juniperus horizontalis* and *Arctostaphylos uva-ursi*, then by a forest-edge of white pine (*Pinus Strobus*), red pine (*Pinus resinosa*), spruce (*Picea* sp.), balsam (*Abies balsamea*), white cedar (*Thuja occidentalis*), aspen (*Populus* sp.), and white birch (*Betula alba*). The south shore of the Point and the whole of Sturgeon Bay are rocky, with *Scirpus* marshes extending about 50 yards inland to the forest-edge of cedar and scattered spruce, aspen and birch.

The only Parula Warblers we encountered inhabited the forest-edge of the Point and Sturgeon Bay. We located 15 singing males—12 on the north shore of the Point, one on the south side of the Point, and two farther south on Sturgeon Bay. We found four occupied and two old nests all in a line along the north side of the Point.

## THE NESTS

The four active nests (Nos. 1, 2, 3, 4) and the two old nests were very much alike in situation. Each was among 5- to 12-inch-long strands of *Usnea* on the east side of an unshaded, dead or nearly dead, middle-sized balsam, on a small, not very steady limb. The entrance generally used was on the side next to the main trunk, but at times the birds would force their way through the canopy of lichen in another place. The average height of the 6 nests was about 10 feet. Five of them were so hidden in the *Usnea* that to see them we had to stand directly underneath.

The nests were well-woven, compact, semi-pensile structures resembling those of the Orchard Oriole (*Icterus spurius*). They were made of *Usnea*, usually with a few fine pieces of grass two to three inches long. The lining material seemed to be no finer than the rest.

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TABLE 1  
ACTIVE PARULA WARBLER NESTS

Nest	Height	Measurements in Centimeters				Distance between nests
		Inside diam.	Outside diam.	Inside depth	Outside depth	
1	about 10'	4.5	7.5	5.0	7.5	About 500 yards from Nest 2
2	10' 8"	4.9	6.5	4.5	5.8	889 feet between Nests 2 and 3
3	8' 10"	4.0	7.0	4.5	5.5	392 feet between Nests 3 and 4
4	9' 3"	4.1	7.0	5.2	5.7	

Nest 1, found June 28, contained 2 young birds (which left in good order on July 3).

Nest 2 was just being built when we found it July 11. It was made entirely of *Usnea* and was the only nest so composed. We believe that only a single egg was laid in this nest. The egg was laid on the morning of July 15, and was incubated for 15 days before it was removed by some unknown predator. An old nest which had much grass in it was in the same tree about 3 feet away (height 13 feet). This nest almost certainly had been built earlier in the summer of 1949.

Nest 3 held 1 egg when we found it July 12. Two more were laid, respectively on July 13 and 14.

Nest 4 held 2 eggs when we found it July 12, and another egg was laid July 13.

These clutches were small. Wilde (1897: 293) found the average clutch to be 4 eggs. Barrows (1912: 591) stated that an average clutch numbered 3 to 5 eggs, and Chapman (1932: 455) gave 4 to 5 as the average number in a clutch. The lateness of the nesting observed by us may have had something to do with the smallness of the clutches. Wilde (1897: 291) gives the middle of May as the time nests are built. Mousley (1926: 184) reported a nest being built as early as May 25.

Redstarts (*Setophaga ruticilla*), Song Sparrows (*Melospiza melodia*), Myrtle Warblers (*Dendroica coronata*), and Oven-birds (*Seiurus aurocapillus*) were nesting near the Parula Warbler nests.

At the four nests the parent birds, both males and females, varied considerably in color. Two males were quite handsome, with wide red and blue throat-bands, while another male could scarcely be distinguished from its mate. Three females had clear yellow throats or showed only a trace of blue. One bird, whose mate we never saw, had a narrow throat-band of blue with a hint of red in it. We assumed that this bird was a female, for it was very faithful in



FIG. 1. Female Parula Warbler returning to nest (No. 1) with food for young. Photographed at Wilderness State Park, Emmet County, Michigan, on June 30, 1949, by Richard and Jean Graber.

incubating the eggs and caring for the young. Of 45 skins of female Parula Warblers examined at the University of Michigan Museum of Zoology, six had coloration similar to that of this bird.

We found Nest 2 at about 11 a.m. on July 11, through chancing to see the female fly to the site. We believe that she had started it earlier that day. We watched her working for an hour (until 12 m.). During much of this period she devoted her attention to making a cylindrical curtain of *Usnea* which was suspended above and about the nest. She pulled and wove the fibers together with an extremely rapid shuttling of her bill. When she had completed the curtain to her satisfaction, she began gathering *Usnea* for the nest itself. This she obtained not only in the nest-tree but also in trees close by.

A large white pine about 6 feet from the nest had tufts of *Usnea* growing on its trunk. Often she flew to this tree and, hopping down its trunk in the manner of a Black and White Warbler (*Mniotilta varia*), pulled a few fibers (2 to 3 inches long) from the bark and carried them to the nest. After weaving these in, she sometimes hopped out to the entrance and cocked her head from side to side as though appraising the effect. Occasionally when leaning over a limb, pulling at a fiber, she lost her balance, fell off, and fluttered in mid-air still hanging onto the fiber with her bill. Once we saw her swing upside-down, chickadee-fashion, while working at the bottom of the nest from the outside.

On one occasion the male came to a tree near the nest-tree and watched the female working. After a few minutes he flew to the nest, whereupon we heard a loud snapping of bills and saw both birds fly away. Presently they returned, alighted in a tree six feet from us, and chipped loudly. When the male flew off the female returned to her nest-building. Later the male came again and chipped at us but did not go to the nest—at which the female was busy working. She continued with her work, seemingly paying no attention to his *chip*. Throughout most of the hour the male sang at 20-second intervals in birches 20 to 30 yards from the nest. By the end of the day the nest had taken shape but was very thin-walled. We could see through the bottom.

The next day (July 12) we made continuous observations at the nest from 8:33 a.m. to 12:30 p.m. During this period the female thickened the walls and bottom with *Usnea* gathered nearby. The male was in the vicinity (we heard him sing 3 times), but he did not appear until another male flew into a tree about 10 feet from the nest. Both owners of the nest resented this intrusion. Flying to the tree in which the visitor perched, they gave angry *buzzing* notes. The visitor left, pursued by the male, and the female returned to the nest. Most of her time was spent strenuously gathering *Usnea*, making trips to the nest at 1- to 1½-minute intervals, and spending only 10 to 15 seconds at the nest each time. When she paused to feed, she flew to small conifers near the nest.

Once the male visited the nest while the female was gone. He looked at it from several angles and even entered; then, with a few scarcely audible *chips*, he flew away. Later he came and coaxed the female to leave with him. She

followed a short distance and then flew back to the nest. Again the male approached and this time succeeded in coaxing the female away. Both birds flew out of sight. On one occasion a wandering band of Black-capped Chickadees (*Parus atricapillus*) excited the male when they approached, but the female went on gathering *U.snea* as usual.

The female seemed to work more slowly before than after 10:30 a.m. It took her, without any help from her mate, four days to build the nest. On the fifth day she laid the one and only egg of the clutch. We observed that incubation began with the laying of this egg, and though we checked it several times each day between dawn and dark of the fifteen days the egg was incubated, we never saw a second egg.

#### INCUBATION

Nest 3 contained one egg (which had a tiny triangular hole in its side) July 12. A second egg was laid on the morning of the thirteenth. The female was sitting on the two eggs at 11:30 o'clock. The third and last egg was laid the following morning. We believe that incubation started just after the laying of the second egg. We did not see the female anywhere in the vicinity of the nest on July 12, but on July 13 we flushed her from the nest twice (11:30 a.m. and 4:30 p.m.). One egg hatched July 26, another the following day. (The egg with the hole in it did not hatch.)

Nest 4 contained two eggs when we visited it late in the day on July 12, and a third was in it at 11:35 a.m. the following day. On the morning of July 24 the three eggs were intact, but the female seemed unusually excited and reluctant to leave. On the following morning the nest held one young bird and two eggs (no eggshells). The two eggs did not hatch. Since we did not mark the eggs, we do not know which one hatched. The incubation period was at least 12 days, in any event, and possibly as long as 14 days.

*Nest 3.* On July 21 (the eighth day of incubation), at 7:30 a.m. we flushed the female from her clutch of three eggs. She feigned injury as she left the nest, spreading her tail and flying close to the ground, then rising to a perch 10 feet from the nest-tree where she chipped excitedly. She continued the alarm for 20 minutes, then left the area. In the next 2 hours and 20 minutes, the female came to the nest-tree repeatedly, but did not enter the nest, although once she flew directly to it. On one occasion, after an absence of 2 minutes, she returned with the male. He flew to the top of the nest-tree, then to a perch above us, chipped a few times, and left. This was the only time during the incubation period that we observed the male at the nest-tree.

The marked excitability of the female at this nest was evident from several characteristic actions, the commonest of which was wiping the sides of her bill on some branch. She did this even when she had eaten no food, and the mannerism seemed to be a sort of nervous reaction to the intruder. After the eggs had remained uncovered 2 hours and 40 minutes, we discontinued observation.

*Nest 4.* We began observations at 7:20 a.m., July 21 (ninth day of incubation). A bird was sitting on the nest at that time. The only bird we ever saw at this nest was almost certainly a female, though it was very handsomely colored.

Only once did we hear a male singing near Nest 4, and then only for a few minutes at a time when the female was incubating.

The incubation rhythm was quite regular. During 7 hours of observation on July 21, the bird left the nest 12 times, the shortest inattentive period having been 2 minutes, the longest 37 (average 11). The 13 attentive periods averaged  $21\frac{1}{2}$  minutes. Five of the seven hours were spent incubating.

The female behaved differently the following day. From 5:15 a.m. to 8:15 p.m. she left the nest 36 times for an average of only 4 minutes, and incubated the rest of the time. The longest period spent off the nest was 6 minutes, the shortest, 2. The attentive periods varied between 10 and 43 minutes (average 21 minutes).

The periods of incubation and of rest tended to be longer in the morning, though not markedly so. A marked variation occurred after 7:00 p.m., when both periods became increasingly shorter. At 8:15 we had to stop our observation. The sun was already below the horizon, and the nest a dark silhouette, yet only 10 minutes before our leaving the bird was away from the nest. It seems probable that this was close to the last trip of the day. Twelve and a half of the 15 hours the bird had spent on her eggs.

The activity of the bird during these periods of observation followed a very uniform pattern. She left and returned to the nest quickly and quietly. In leaving the nest she almost invariably flew inland in the same direction, and returned via the same route, usually flying to a favorite perch below the nest, from which she hopped to the side entrance. We frequently noted movement in the nest from 1 to 3 minutes before she actually departed.

We never followed the bird during her away-from-the-nest periods, though in these short intervals she could not have gone far. Very often upon returning she wiped her bill on a branch as if cleaning her mandibles before entering the nest.

Throughout the period of our study, numerous bands of Black-capped Chickadees, Golden-crowned Kinglets (*Regulus regulus*), and warblers wandered about the woods. Several times we saw one or more of these birds hopping about the nest-tree within 2 or 3 feet of the incubating Parula Warbler, yet neither did they show interest in the nest, nor were they driven away.

#### NEST SUCCESS

The June nest held two young birds when we found it, and these left in good order (as above stated). We do not know how many eggs had been laid in this nest.

The three July nests held a total of seven eggs, of which three hatched—two in one nest (three eggs), one in another (three eggs), none in another (one

egg). Of the three young, one left the nest in good order. The two siblings in one nest were destroyed by some predator when they were about seven days old.

Grand total of eggs in the four nests: at least 9; of young hatched: 5; of young which lived to leave the nest: 3 (one of the latter we collected, July 3).

A less than one-day-old nestling (the second of Nest 3) which we critically examined on July 28 had a sparse patch of rather long silky white down on the head, and another along the mid-line on the dorsum. Otherwise it was naked, and the skin, bill, and legs were all of about the same shade of pinkish yellow. Tiny dark blood quills were visible through the skin of the wings. Late in the day on July 29 we examined this bird again, finding that the bill had become slightly more yellow, the incoming feather tracts more obvious, and the down of the head and back a trifle darker. On July 30 the down appeared to be even darker.

At Nest 1 (June) the male parent regularly brought food to the two young. The male and female at this nest were so similar in color that we would have entertained grave doubts concerning the male's coming to the nest at all had we not seen *both* birds there with food on several occasions. At Nests 2 and 3 the male parent did not bring food at all regularly. Not once did we recognize a male bird at Nest 4.

The behavior of the parent birds at Nests 3 and 4 merits special discussion. We spent 12 hours observing these nests on July 27 and two hours observing Nest 4 on August 4. The wildness of the female at Nest 3 has already been mentioned. This female brought food to her 2 nestlings only 14 times during a 5-hour period on July 27. The longest interval between feedings was 68 minutes, the shortest 5, the average 20. She brooded her young once for a period of 19 minutes. The male approached the nest with food only once. When he was within a few inches of the nest, the female flew swiftly at him driving him from the nest-tree. During the remaining two hours of our observations that day we did not see the male again. We were stationed fully fifty feet from the nest-tree, yet our presence obviously distressed the female. Occasionally she settled down into the nest as if to brood, then left hurriedly.

The females at Nests 3 and 4 gathered food within a few yards of the nest-trees, usually in conifers. Their behavior was kinglet-like as they hopped quickly about the branches. Occasionally they fluttered at the end of a twig. They found numerous green lepidopterous larvae among the pine needles. Frequently they caught a May fly (Ephemera) or another of the winged insects that abounded along the shore.

At Nest 4 the female had only one nestling to tend, yet her feeding rate was almost as great as that of the female at Nest 3. During a six-hour observation period (July 27) she made 19 trips carrying food. The shortest interval between feedings was one minute, the longest 51, the average 19. She brooded the nest-

ling immediately after 14 of the 19 feedings. The shortest brooding period was six minutes, the longest 27, the average 17 (total: almost four hours of brooding during that particular observation period).

At no time did we see a parent bird remove a fecal sac from a nest. Mousley (1924: 268) reported that he never saw a parent Parula Warbler carrying off a fecal sac. The adult probably swallows the fecal sac while its head is out of sight within the nest.

On the morning of August 4 we unintentionally so disturbed the young bird in Nest 4 that it left prematurely. Neither adult was in the immediate vicinity at the time. The young bird, which was 10 days old, was well feathered, and quite capable of hopping from branch to branch, but did not attempt to fly. It was in handsome juvenal plumage. It was, generally speaking, blue-gray above (with a greenish wash on the back) and white below, with distinct white wing-bars.

When the female parent returned, with a May fly in her bill, she gave sharp chips of alarm as she hopped toward the nest. The young bird, which was sitting quietly on a branch very near the nest, did not beg for food even when its parent was within a few inches. The adult looked at the nestling but peered into the nest three times before hopping to the young bird and poking food at its bill. This did not evoke a begging reaction and the parent swallowed the food and flew off. In about 10 minutes she returned with a large brown larva, went directly to the nest, looked in, then hopped over to the young bird, fed it and left. When the female returned with more food, she made an unsuccessful attempt to feed the young one, then moved toward and entered the nest. Settling down, she grew quiet, as if brooding the empty nest. After remaining in the nest for 8 minutes she began moving about restlessly, climbed out of the nest, and flew off. Presently she returned with more food. This time the young bird fluttered its wings, begged, jumped to the branch on which its mother had alighted, and was fed promptly.

The female continued to bring food at three- to five-minute intervals. Often, following what must have been a very powerful instinct, she went to the nest before going to the nestling, but this interest in the nest gradually waned. Once we saw her take a fecal sac as it was passed, and carry it away. At other feedings she looked for sacs, but this was the only instance in which she carried one away. The behavior of the young bird and also that of the adult clearly indicated that the juvenile had left the nest prematurely.

While the female was away, the young bird preened itself energetically and changed its position frequently, though it remained near the trunk of the nest-tree. Its colors matched those of its surroundings remarkably well. The lichens *Usnea cavernosa* and *Parmelia physoides*, which grew so abundantly on the branches of the nest-tree, were of almost the same shade of bluish gray as that of the upper parts of the young bird.



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SUMMARY

The Parula Warblers which inhabited Wilderness State Park, Emmet Co., Michigan, in the summer of 1949 seemed to be nesting principally in the forest-edge along the shore of Lake Michigan. Four active and two old nests, situated in dense clumps of the lichen *Usnea cavernosa*, averaged 10 feet above ground. All six nests were in medium-sized, dead or nearly dead balsams (*Abies balsamea*). They were semi-pensile, and were made almost wholly of *Usnea*. Three of the four active nests were finished when found. The incomplete one was finished entirely by the female, while the male sang nearby and defended the territory. Complete clutches of 1, 3, and 3 eggs were observed. Grand total of eggs in the four nests: at least 9; of young hatched: 5; of young which lived to leave the nest: 3. At two nests the incubation period was not less than 12 nor more than 14 days. Incubation rhythm was regular. Incubation was performed exclusively by the female, who left the nest for a short period every 20 to 30 minutes. Both sexes fed the young, though the male was less active than the female in doing so. One young Parula Warbler left the nest prematurely at the age of 10 days.

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